

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior listing of claims in this application.

Claims 1-50. (Canceled)

51. (Currently amended) A method of forming a semiconductor memory device comprising:

forming a metal over a substrate;

patterning said metal into a structure having an outer surface;

blanket depositing a chalcogenide material over said substrate and on said metal structure outer surface;

diffusing a portion of said patterned metal outwardly into a portion of said chalcogenide material; and

etching a portion of said chalcogenide material into which said patterned metal has not been diffused.

52. (Original) The method of claim 51 wherein said blanket depositing said chalcogenide material comprises chemical vapor deposition.

53. (Original) The method of claim 51 wherein said forming said metal comprises blanket deposition.

54. (Original) The method of claim 51 wherein said portion of said patterned metal diffused outwardly into said chalcogenide material comprises less than all of said patterned metal.

55. (Original) The method of claim 54 wherein the portion of said patterned metal not diffused outwardly into said chalcogenide material is smaller but substantially the same shape as said patterned metal before said portion of said patterned metal is diffused outwardly into said chalcogenide material.

56. (Original) The method of claim 51 wherein said portion of said patterned metal diffused outwardly into said chalcogenide material comprises all of said patterned metal.

57. (Original) The method of claim 51 wherein the step of diffusing a portion of said patterned metal outwardly into said chalcogenide material comprises irradiating through said chalcogenide material to said patterned metal.

58. (Original) The method of claim 57 wherein said irradiating comprises irradiating through said chalcogenide material to said patterned metal with electromagnetic radiation having a wavelength less than 500 nanometers.

59. (Original) The method of claim 58 wherein said electromagnetic radiation has a wavelength of about 404 nanometers to about 408 nanometers.

60. (Original) The method of claim 58 wherein said electromagnetic radiation has a wavelength of about 405 nanometers.

61. (Canceled).

62. (Currently amended) The method of claim ~~[[61]]~~ 51 wherein said etching comprises dry anisotropic etching.

63. (Currently amended) The method of claim ~~[[61]]~~ 51 wherein said etching comprises dry anisotropic etching using a gas chemistry comprising CF₄.

64. (Currently amended) A method of forming a semiconductor memory device comprising:

forming a patterned metal structure having an outer surface over a substrate;

blanket depositing a chalcogenide material on said patterned metal structure outer surface;

diffusing a portion of said patterned metal outwardly into a portion of said chalcogenide material; and

etching a portion of said chalcogenide material into which said patterned metal has not been diffused.

65. (Original) The method of claim 64 wherein the step of forming a patterned metal structure having an outer surface comprises the steps of:

forming a metal over a substrate; and

patterning said metal into a structure having an outer surface.

66. (Original) The method of claim 64 wherein the step of diffusing a portion of said patterned metal outwardly into said chalcogenide material comprises irradiating through said chalcogenide material to said patterned metal.

67. (Original) The method of claim 66 wherein said irradiating comprises irradiating through said chalcogenide material to said patterned metal with electromagnetic radiation having a wavelength less than 500 nanometers.

68. (Original) The method of claim 67 wherein said electromagnetic radiation has a wavelength of about 404 nanometers to about 408 nanometers.

69. (Original) The method of claim 67 wherein said electromagnetic radiation has a wavelength of about 405 nanometers.

70. (Canceled).

71. (New) A method of forming a semiconductor memory device, said method comprising:

forming a first electrode over a semiconductor substrate;

forming a metal layer over said first electrode;

forming a layer comprising a chalcogenide material over said first electrode and said metal layer;

irradiating said metal layer to diffuse at least a portion of metal ions from said metal layer into portions of said chalcogenide layer, wherein said chalcogenide layer comprises a first region with metal ions diffused therein and a second region without a substantial amount of metal ions diffused therein;

removing said second region of said chalcogenide layer, wherein said first region of said chalcogenide layer remains; and

forming a second electrode over at least a portion of said remaining first region of said chalcogenide layer.

72. (New) A method of forming a semiconductor memory device comprising:

forming a first metal layer over a semiconductor substrate;

forming a second metal layer over said first metal layer;

forming a chalcogenide layer over said first and second metal layers;

diffusing a portion of said second metal layer into a portion of said chalcogenide material to form a first and second region, wherein said first region comprises metal ions from said second metal layer; and

removing said second region from said chalcogenide material.